equipped laboratory is one of the most important and necessary parts of a cyanide plant. The control, testing, and analysis of solutions is treated in a fuller manner than is usual with books of this class, and of the three methods given we prefer the silver nitrate test. The tables for the assay of cyanide solutions are a useful addition to this chapter. The appliances for cyanide extraction are briefly described, and although accompanied by several good scale drawings, certain details are omitted which might have been profitably included.

The synopsis of the process for the actual extraction by potassium cyanide is well written, and the conditions for successful treatment, such as strength of cyanide solution, &c., are stated as clearly as one could wish. Chapter vii. deals with the applications of the processes at different works. Leaching and precipitation are succinctly dealt with in Chapters viii. and ix. These are followed by a short description of the Siemens-Halske electrical process, which not only deposits the gold, but gives rise to the production of a number of valuable commercial bye-products, such as lead, copper, litharge and paint. For all those who wish to obtain a sound knowledge of the cyanide process, as conducted at the present time, we heartily commend Park's handbook.

OUR BOOK SHELF.

The Cause and Prevention of Decay in Teeth. By J. Sim Wallace, M.D., B.Sc., L.D.S. Pp. 101. (London: J. and A. Churchill, 1900.)

THIS is a reproduction in book form of a series of articles published in the *Journal* of the British Dental Association.

The subject has been dealt with in the light of the now universally accepted chemico-parasitic theory of dental caries, but the author treats less of exciting or immediate causes than of those remote and predisposing. He attributes the great and increasing prevalence of dental caries among civilised nations to the elimination of the coarser and more fibrous parts of foodstuffs from the diet, and points out that this may act in two ways. Firstly, owing to the absence of mechanically detergent constituents of food, more of the fermentable, acid-producing and germ-sustaining parts of the latter remain in contact with the teeth for some time after meals. Secondly, that the tongue, being less actively employed during the act of chewing and swallowing, fails to attain its full size and exercise its normal important function in modelling the dental arches, so that irregularities arising from crowding and malposition of the teeth serve to intensify their predisposition to caries.

The subject is, on the whole, efficiently dealt with, and the book may be recommended to the medical practitioner or intelligent layman.

It is a pity, however, that the author lays such persistent stress upon what he considers the daring heterodoxy of his opinions, as these are at most modifications of those currently accepted. It is somewhat irritating, too, to find set forth for the instruction of the dentist, and with an air of great originality (as on p. 94), certain points in the operative treatment of caries which are among the very first impressed upon all students in schools of dental surgery.

Surely, too, the accusation of ignorance of the causes of the diseases he attempts to combat, and empiricism in practice, are undeserved by the educated dental surgeon of to-day. HAROLD AUSTEN.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Atmospheric Electricity.

IN a letter on this subject in NATURE of March 29, Mr. Aitken criticises the theory which attributes the prevalence of positive electrification in the atmosphere to the superiority in efficiency as nuclei for the condensation of water vapour, of the negative ions over the positive.

That any difference in the degree of supersaturation necessary to make water condense on positively and on negatively charged ions would result under suitable conditions in the production of an electric field was pointed out by Prof. J. J. Thomson (*Phil. Mag.* vol. xlvi. p. 533), and it was suggested by him that this might be a source of atmospheric electricity. Experiments made by the present writer proved that there is such a difference, and that water vapour condenses much more readily on negative than on positive ions; while Elster and Geitel (and independently, Lenard) have recently brought forward evidence based on their own experiments and those of Liuss, tending to show the existence of free ions in the atmosphere.

There remains the question whether the necessary degree of supersaturation can ever occur in the atmosphere. Mr. Aitken contends that there is no such thing as dust-free air in the atmosphere, and that therefore any considerable degree of supersaturation is impossible.

Air practically dust-free does, however, seem to have been met with on Ben Nevis, accompanied by something very like supersaturation (Rankin, *Journ. Scot. Met. Soc.* vol. ix. p. 131). In Mr. Aitken's own papers, too, records of small numbers of dust particles (sometimes considerably less than 100 per c.c.) are not rare; and the lowest values are met with just under the conditions where their occurrence is of most significance. For "most of the low numbers in the tables were observed during rainy weather, and the very low ones in misty rain, when the clouds were at or near the surface of the earth" (Aitken, *Edin. Trans.* xxxvii. p. 664). Again, the purest air met with by Mr. Aitken was that blowing from off the Atlantic Ocean, the mean number of dust particles in a series of 258 observations extending over nearly five years amounting to 338 per c.c.; on one occasion the number was as low as 16 per c.c. (*Edin. Trans.* xxxvii. p. 666). Air coming from such a region can hardly be considered as abnormal. Moreover, such observations are necessarily made in air within a few feet of the ground; at a greater height it is likely to be less contaminated.

Consider a mass of air occupying 1 c.c. and saturated with water-vapour at 10° C., and let it expand till, say, 3×10^{-6} gram. (less than one-third of the total water) has condensed to form 100 drops. Let us suppose the drops to be equal in size and let us calculate the volume and thence the radius of each drop, and from this obtain the rate at which they will fall relatively to the air (assuming the velocity $= \frac{2}{9} g \frac{r^2}{\mu}$, the viscosity μ being taken as $1 \cdot 8 \times 10^{-4}$). We obtain for the radius of each drop the value $1 \cdot 9 \times 10^{-3}$ centim., and for the rate of fall through the air, $v = 4 \cdot 4$ cms. per second.

In a rising current of moisture-laden air containing 100 dust particles per c.c. there is thus no difficulty in seeing how the drops as they ascend may grow large enough to lag behind the air at the rate of 4·4 cms. per second (= 160 metres per hour); while the greater part of the moisture in the surrounding air is still retained as vapour. If then the upper surface of the cloud is carried to such a height that the drops reach the size $r = 1 \cdot 9 \times 10^{-3}$ cm., it will there be lagging behind the rising air at the rate named, and a dust-free layer must exist immediately above it, increasing in vertical thickness at the rate of something like 180 metres per hour. Even if 1000 drops were formed in each c.c. of the cloud, the rate of growth of the dust-free layer would, as a similar calculation shows, when the same quantity of water had separated, amount to 34 metres per hour.

A difficulty raised by Mr. Aitken in connection with the removal of dust particles by condensation of water upon them is this: "When a cloud forms in ordinary impure air, only a small proportion of the dust particles become active centres of